

# Review about the importance of skin mucus from asian swamp eel (*Monopterus albus*)

**Keywords:** monopterus albus, insect larvae, shrimps, cray fish, frogs, tadpoles

## Taxonomy and distribution of asian swamp eel

Asian swamp eel, *Monopterus albus* belongs to the family synbranchidae under the order synbranchiformes.<sup>1</sup> It is originating in the East and Southeast Asian countries.<sup>2</sup> It feeds on small fishes, prawns, worms, snails, insect larvae, shrimps, cray fish, frogs and tadpoles. It was also found that swamp eel consumed phytoplankton, benthic algae and organic debris.<sup>3</sup> It lives in muddy areas, rice paddies, ponds and slow flowing currents, it has a unique morphological elongated body, similar to snake, covered with mucus without scales or fins, it has the ability to breathe air through the buccal mucosa, and it is hermaphrodite as it can undergo sex reversal naturally,<sup>4,5</sup> but the exact mechanism still unknown.<sup>6</sup>

## Biological activities of asian swamp eel skin mucus

Asian swamp eel mucus is secreted by the epidermal goblet cells in the epidermis which composed from inorganic salts, immunoglobulins, lipids and gel forming macromolecules such as mucins, and other glycoproteins suspended in water,<sup>7</sup> which giving the mucus lubricating properties.<sup>8</sup> The mucus layer is continuously replaced which protect the eel from stable colonization by bacteria, parasites and fungi.<sup>9</sup> The functional properties of the mucus depend on its ability to form a gel on the epithelial surface,<sup>10</sup> which produce antimicrobial molecules serve as the first line of a host's defense against microbial invasion.<sup>11</sup> The mucopolysaccharides in the mucus has a high value for immunoprotection and defense mechanism.<sup>12,13</sup> It has been proven that mucin has potential of antimicrobial and noxious properties,<sup>14</sup> as it plays an important role to protect the eel from pathogens.<sup>15</sup> Overall mucus layer on the surface of eel functions as a physical and biochemical barrier between eel and its environment.<sup>16</sup>

### Antimicrobial activities

Asian swap eel skin mucus contains antimicrobial peptides cause formation of pores in bacterial membranes which leads to bacterial killing, moreover the mucus has anti-bacterial proteins can affect essential bacterial functions by binding to DNA in the bacteria.<sup>17,18</sup> It has been demonstrated that mucus prevents the colonization of pathogenic micro-organisms on the surface of the eel.<sup>19</sup> *M albus* swamp eel skin mucus has a performance assessment for determining malachite green,<sup>20</sup> which has antimicrobial properties.<sup>21</sup> It has been also claimed that the soluble and insoluble proteins in the mucus are responsible for the Antimicrobial and haemolytic activities.<sup>22</sup>

### Antibacterial activities

Antibacterial proteins/peptides have been found in the skin mucus of different fish species including Asian swamp eel.<sup>23–26</sup> Different extracts have been used of *M albus* to test the antibacterial activity and the results showed a significant bacteriostatic effect of these extracts.<sup>27</sup>

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 Ayah Rebhi Hilles,<sup>1</sup> Syed Mahmood,<sup>2,3</sup> Mohd Arifin Kaderi,<sup>1</sup> Ridzwan Hashim<sup>1</sup>
<sup>1</sup>Department of Biomedical Sciences, International Islamic University Malaysia, Malaysia

<sup>2</sup>Department of Pharmaceutical Engineering, University Malaysia Pahang, Malaysia

<sup>3</sup>Centre of Excellence for Advanced Research in Fluid Flow (CARIFF), University Malaysia Pahang, Malaysia

**Correspondence:** Ayah Rebhi Hilles, Department of Biomedical Sciences, International Islamic University Malaysia, Malaysia, Email ayah.hilles90@gmail.com

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### Antifungal activities

It has been reported that *M albus* extracts have higher anti-fungal activity as compared to ampicillin.<sup>27</sup> It has been proven also that eel skin mucus extract from Asian local swamp eel, *M albus* has antifungal activities against *Candida krusei*, *Candida albicans*, *Cryptococcus neoformans* and *Fusarium* species.<sup>28</sup>

### Anticancer activities

It has been showed that the eel skin mucus generally considers as a promising candidate to be used as anti-tumor therapy because of induction mitochondria-mediated apoptosis through membrane interaction against K562 human leukemia cells.<sup>29</sup> Specifically, *M albus* showed higher levels of antiproliferative activity.

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### Conflict of interest

The authors declared that there is no conflict of Interest.

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